

Weathering tests for the highest demands

With the Global-UV Test Unit Type UV200
Weiss System – Construction as per the Federal Institute
for Materials Research and Testing

Flexible in use . . .

Further development of tried and tested technology

Aided by a profound understanding of the essential, functional requirements were harmonised with an attractive design in the further development of the Global-UV test unit.



The outstanding features . . .

- Weathering tests according to DIN EN ISO 4892-3 procedure A (lamp combination) cycle number 3+4, DIN EN 12224, VDI 3958 page 12, DIN EN 1297 and EOTA TR-010 with high temperature and humidity constancy and aerosol-free humidification.
- Universal use in the framework of tests, materials development and damage assessments: Simulation of extreme climates and of acid rain (pH value ≥ 3), e.g. for the ADF (acid dew and fog) and the AR (acid rain) test (VDI 3958 page 12).
- Weathering of specimens and components with large surface areas
- Efficient ratio of useful test space area and installation surface
- Removable radiation door which is easily opened for good access to the test chamber
- The spectral irradiance can be varied by means of the use of other fluorescent lamps
- Folding screen made of special safety glass for easy access to light sources
- Digital SIMCON/32*-NET measuring and control system with 32 bit processor
- Environmentally friendly materials
- Low investment, operating and maintenance costs



Das Global-UV-Testgerät Typ 200 in der Ansicht mit geöffneter Bestrahlungstür.

The type 200 Global-UV test unit as seen with opened radiation door.

Decisive factors ...

Products made from polymers, such as plastics and laminates, vehicles paints and technical textiles, are frequently required to withstand a range of climate conditions.

In practical application, the simultaneous impact of

- UV radiation
- Temperature
- Air humidity
- Rain (including acid rain)
- Mechanical effects

and their cyclic change, e.g. in the diurnal rhythm, are decisive for ageing behaviour.



In this context, UV light in sunlight and diffuse sky radiation is especially important. It can cause alterations in the surface of materials, which – accelerated by other climate factors, such as temperature and humidity – lead to the typical symptoms of ageing, e.g. dullness, discolouration, cracks, brittleness and molecular change.

Staggered simulations of natural weathering in devices always requires a restriction of the number of climate values or their cyclic alterations. The Global-UV test unit simulates the most important climate factors which are relevant for ageing.

In today's competitive environment, the reliability of materials is a decisive factor.

The new generation . . .

Radiation . . .

In other test procedures, too much attention is paid to the simulation of the entire global radiation and the simulation of other important climate factors is neglected.

However, it is also important that temperature conditioning and humidification are controlled in a reproducible manner and that the air is humidified without aerosols. Moreover, any uncontrolled overheating on account of the radiant heat of the lamps has to be prevented.

Test procedures according to DIN EN ISO 4892-2 prescribe e.g. the simulation of the overall range of global radiation, the disadvantage of which is that the influencing factors of specimen temperature and humidity or their cyclic alterations can only be controlled very vaguely. In test procedures with fluorescent lamps according to DIN EN ISO 4892-3 only the simulation of the photochemically effective spectral range ≤ 400 nm (UV-A and UV-B radiation) is prescribed. This means we dispense with radiation heating of the specimens but gain the possibility of climate conditioning the specimens in the entire natural temperature and humidity range in a precise and reproducible manner.

Within the UV-Global test unit, radiation is effected with special fluorescent lamps in the wavelength range from 290 nm to 450 nm.



Apart from radiation, other climate factors also play an important role.



The advantages at a glance . . .

The Global-UV test unit has a modular design and is delivered ready for plugging in so that assembly and commissioning on site are not required. A condensate drain or an exhaust system to be provided by the client is not an absolute necessity.

The entire system is designed for use under extreme conditions and ensures reliable operation and a long service life.

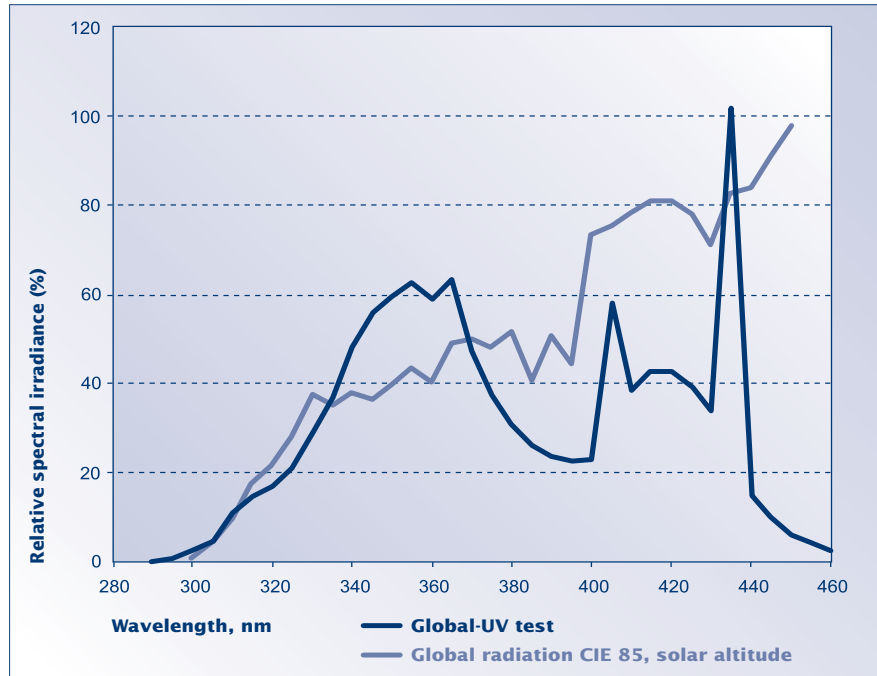
- Aerosol-free humidification
- Highly efficient and uniform temperature conditioning and climate conditioning of the test space
- Specimen protection t_{\min}/t_{\max}
- TFT colour touch panel with simple, menu-driven operation (programming skills not required)
- 32 bit processor
- Steplessly controlled setting of the irradiance
- Networking with other test systems possible
- Spraying system with recirculation pump and reservoir
- Automatic switch-off of the UV radiation upon opening of the test space door
- E-part (swerving) and TFT colour touch panel in protection class IP 54
- Service-friendly design on account of good accessibility of the components which are relevant for maintenance

Technical description ...

The illustration shows the relative irradiance in the Global-UV test unit compared with the global radiation according to CIE publication no. 85 (1989). The irradiance in the UV range corresponds to the maximum UV irradiance in Davos.

The spectral range above 400 nm which has been expanded compared with the requirements laid down in DIN EN ISO 4892-3 takes account of the fact that very sensitive materials can display photoreactions up to 450 nm. Because of this an improved correlation of the results with natural weathering can be expected.

However, this is not the only aspect in which the Global-UV test unit differs from more simple executions of devices for these standards.



With regard to climate conditioning of the test chamber, the Global-UV test unit is also the only device which provides an exact adjustment of temperature and humidity with corresponding positive effects on the reproducibility and comparability of weathering results.

Exact controlling is of special importance since temperature changes of $\pm 1^\circ\text{C}$ can alter the ageing results by $\pm 8\%$.

Industrialised countries often experience acid rains with low pH values. The Global-UV test unit allows testing with acid precipitation of $\text{pH} \geq 3$ or according to the VDI guideline 3958 page 12 (Environmental simulation – Impact of acid precipitation on polymer materials – Test procedures, edition 2004-02) and the draft for DIN 55663 (Coating materials – artificial weathering with additional acid impact, draft for a new standard, edition 2007-09).

- Error diagnosis system for supporting maintenance and repair
- Considerable increase in the service life of the psychrometer on account of self-cleaning humidity sensors
- Automatic refilling of water with a big reservoir without any interruption of operation
- Standard pipe port ($\varnothing 50 \text{ mm}$) for inserting supply lines, etc.
- Low connected electric loads
- Environmentally friendly high-quality insulation
- Adjustable feet, individually height adjustable
- Powder coating
- Standard calibration of 2 temperature values ($+20^\circ\text{C}$ and $+80^\circ\text{C}$) and of 2 climate values ($+23^\circ\text{C}/50\% \text{ r.h.}$ and $+50^\circ\text{C}/10\% \text{ r.h.}$)

Function and technology...

Functional principle

Air conditioned to precisely the desired value flows continuously through the test chamber. The air circulation channel installed at the rear of the test chamber contains the components required for air conditioning. The air circulating system guarantees optimum routing of the air.

The newly developed patented climate system permits a high relative humidity even under heat load.

The humidity of the test chamber air is measured psychrometrically with two Pt 100 resistance thermometers. Dry and wet-bulb thermometers are positioned next to each other in the circulating air stream. The fabric of the wet thermometer is submitted to forced humidification depending on the respective climate. This considerably increases the service life!

The SIMCON/32*-NET control system controls the temperature and the humidity.

An external air fan can be switched on in addition for fast dehumidification and rinsing.



TFT colour touch panel



Wet-bulb thermometer with forced humidification



The Global-UV test device in use

... with a sophisticated design

Construction features

The self-supporting external housing is made of corrosion-resistant, galvanised steel plate and painted in two colours (RAL 5000 blue and RAL 9002 grey-white).

The test chamber is made of corrosion-resistant galvanised sheet steel. A stainless steel grille is fitted to the air circulation wall, on which specimens or specimen containers can be suspended.

The environmentally friendly insulation between the test chamber and the external housing guarantees the best possible insulating values and, hence, the lowest possible operating costs.

The radiation door is fitted with 18 fluorescent lamps which emit different wavelengths simulating the photochemically active spectrum of natural global radiation between 290 and 450 nm.

These lamps operate with electronic ballasts which safeguard a radiation output which is independent of fluctuations in the mains voltage. The reduction in the radiation which is caused by the ageing of the lamps is compensated automatically.



The radiation door is hinged on the left. The handle ensures that the door is sealed with the required pressure at all times.

The Global-UV test unit is fitted with one pipe port made of a material with low thermal conductivity. It is installed in the right side panel and can be used to install measuring and control lines, other supply connections or additional equipment.

In addition to the adjustable threshold monitoring in the SIMCON/32*-NET control system, the Global-UV test unit is equipped with an adjustable under- and over-temperature protection (protection of specimens with a separate sensor) according to EN 60519-2 (1993).

Warnings are given optically and as a text message. In addition to this, a potential-free contact is available. Each electric functional circuit has its own safeguard which shuts down the circuit or the whole unit in the event of malfunctions.

The electric system corresponds to the relevant engineering standards, the accident prevention regulation "Electrical systems and means of production (BGV A2)" as well as the relevant VDE regulations. All test chambers comply with the EMC, low voltage and machinery directives.

The refrigerant used is the environmentally friendly R 404 A with 0 % relative ozone-depleting potential.



The flexible design permits fast maintenance.

Reliable control . . .

Control and program control with the digital measuring/control system

SIMCON/32*-NET

The SIMCON/32*-NET is a self-monitoring, digital 32 bit measuring and control system and has been designed specifically for use in test cabinets.

With its computing power, the SIMCON/32*-NET fulfils the requirements of procedural engineering and simplifies the input function with a touch panel developed specifically to that end.

The TFT colour touch panel with graphics capabilities and a resolution of 640 x 420 pixels is part of the standard equipment.

The SIMCON/32*-NET system provides all the functions which are required for controlling the system. In addition to the control system for temperature and humidity, it also contains a highly efficient software PLC which co-ordinates all functions, monitors and reports malfunctions.



Special features . . .

- TFT colour touch panel, height adjustable, for convenient entering of fixed value and program operation with a graphic display of target and actual values, the run time and the number of the remaining cycles, etc. including a help function
- Program memory for up to 100 programs with a total of 1000 sections, 250 loops and 9999 program cycles
- Software support for the potential free switch inputs and outputs
- 4 potential-free switch inputs and outputs each
- Password protection, with two stages, against inadvertent adjustments
- Integrated limit value monitoring system for temperature and humidity
- Inspection system reports malfunctions and records the unit run times and the switching frequency of individual system components
- Serial RC 232 C interface, separated galvanically, for connection to a higher-ranking computer system or for networking
- Compatible with the simulation management software SIMPATI* for comfortable administration and archiving of the data sets
- 2 extension slots for measuring input and output modules.

Operation and documentation

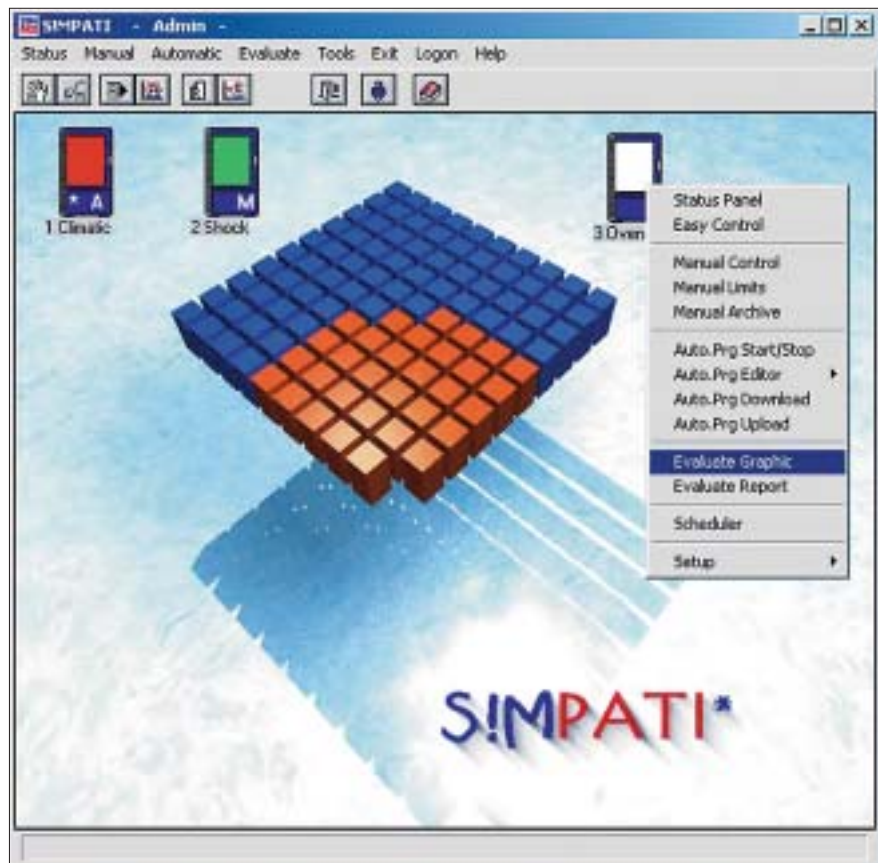
The Global-UV test unit can be operated via

- the TFT colour touch panel or
- SIMPATI*.

The programs developed are transferred into the SIMCON/32*-NET measuring and control system.

Compatibility and flexibility provide new and extended opportunities for test engineering by means of the connection with peripheral systems.

The compatibility with all software products from Weiss Umwelttechnik means that further convenient operation and monitoring options arise.



SIMPATI*

Simulation system for test system integration

The computer-supported simulation management software SIMPATI* is available for gapless documentation and graphic evaluation. If the system is installed on a standard PC, the user has access to the full range of applications under Windows 2000, Windows 2003 Server or Windows XP Professional:

In particular, the following is possible:

- Comfortable development of test programs with the graphic editor
- Controlling the test process
- Recording measured data
- Networking of up to 99 systems
- Administrating your programs for production processes and tests in a clear manner
- Printing out measured data as a graph and copying such into other programs. Internal interfaces make SIMPATI* compatible with
 - Microsoft Word
 - Microsoft Excel
 - National Instruments Labview
 - Special user software by means of on-line and socket interface (TCP/IP access)

Equipment and accessories in detail . . .

Standard equipment

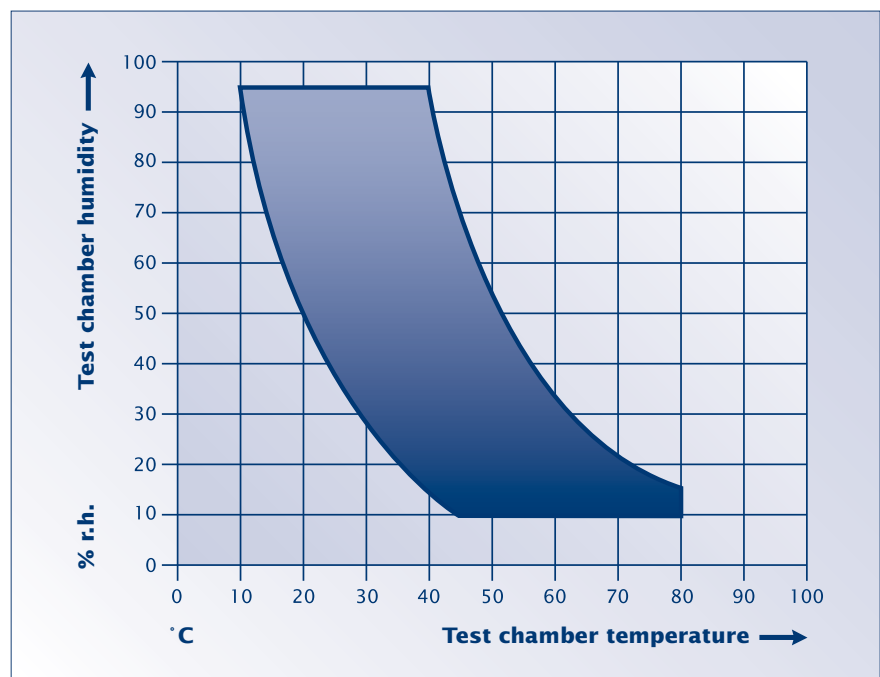


- Digital display of temperature and relative humidity
- Control system for irradiance
- Inspection window with UV-tight flap
- Operating hour counter for the device
- Operating hour counter for radiation, resettable
- 1 port Ø 50 mm (in the left side panel)
- Non-contact switching of the heating
- Spraying with circulation pump and reservoir
- Over-/under-temperature protection according to EN 60 519-2 (1993), with a separate sensor, thermal safety class 2
- Special temperature conditioning system in the climate working range for high temperature and humidity constancy
- Dewing protection with dehumidifier coil in order to avoid the formation of condensate on the specimens
- Psychrometric humidity measurement
- TFT colour touch panel height adjustable
- SIMCON/32*-NET with humidity calculator and integrated limit value monitoring system for humidity
- Insufficient water display
- t' sensor with forced humidification
- Serial interface RS 232 C
- 4 potential free switch inputs and outputs each
- No-contact switching of the heating

Options

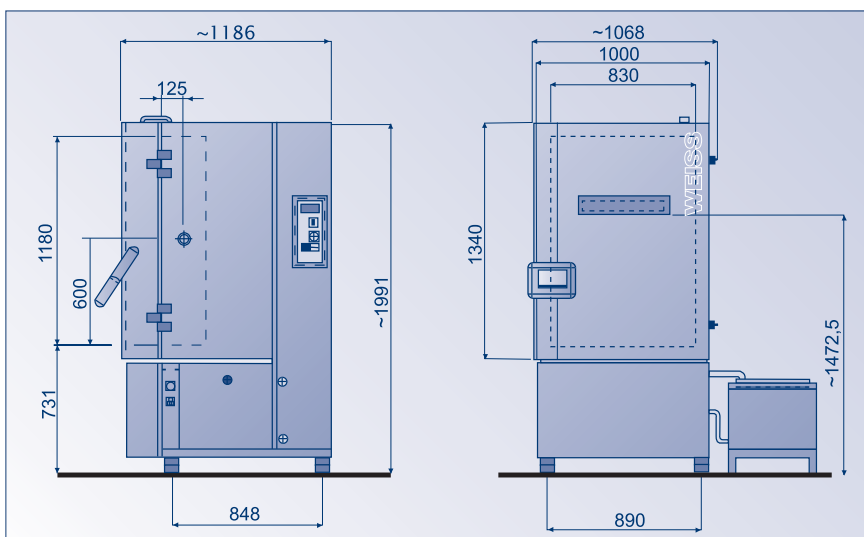
- Automatic re-adjustment of the irradiance via radiation sensor
- Ceiling lugs for securing heavy specimens
- Equipment for testing of horizontal surfaces (roofing felt, asphalt, etc.)
- Rapid temperature change 2 K/min. and 6 K/min.
- Water-cooled execution for re-cooling plant, cold pumping water or town water
- Mobile execution
- Ports for measuring cables, Ø 50 or 100 mm
- Insulating door for use as a climate test chamber for extreme temperature and humidity values
- SIMPATI* software package for Windows 2003 Server, Windows 2000/XP Prof
- Additional potential-free switch inputs and outputs
- System for recording measured data for Pt 100, voltage signals, current signals and thermocouples
- Ethernet/LAN interface (10/100 Mbit) in connection with SIMPATI* for integration into a network
- Configuration modules for interface standards, such as RS 422, RS 485 (4 conductors), IEEE 488.2 and fibre-optic cable
- Additional Pt 100 sensors/Black standard thermometers/thermocouples
- Analog outputs for actual values
- Field bus interface on request
- Fan with speed control
- Different voltages and frequencies
- Calibration deviating from standard

Special accessories on request.



... technical data

Type		Unit	UV200
Test chamber volume		l	200
Test chamber dimensions	Height approx.	mm	1180
	Width approx.	mm	830
	Depth approx.	mm	250
Specimen carrier area		m ²	0.75
External dimensions ¹⁾	Height approx.	mm	2030
	Width approx.	mm	1000
	Depth approx.	mm	1190
Floor clearance		mm	100
Radiation door	Height approx.	mm	1340
	Width approx.	mm	995
	Depth approx.	mm	205
Observation window	Height x width	mm	60 x 500
Temperature range	without radiation	°C	-20 ... +80
	with radiation	°C	-10 ... +80
Temperature constancy	over time	K	≤ ±1
Climate working range		°C	+10 ... +80
Dewpoint temperature range		°C	+9 ... +40
Humidity range (depending on temperature)		% r. h.	10 ... 95
Humidity constancy		% r. h.	≤ ±5
Irradiance in wavelength range from 290 to 400 nm, in accordance with DIN EN ISO 4892-3, procedure A (combination of lamps)	approx.	W/m ²	45.0
Reservoir for precipitation	approx.	l	60
Reservoir for humidifier	approx.	l	8
Water supply for humidifier			Demin. water at max. 0.5 l/h Conductivity at max. 20 µS/cm
Condensate drain			Counterpressure-free, DN 20
Cooling unit			Air-cooled
Finish			RAL 9002/RAL 5000
Mains connection			3/N/PE AC 400 V ± 10% 50 Hz CEE plug, 32 A, 5 pole
Power	approx.	kVA	9.0/25 A fuse, inert
Weight	approx.	kg	500
Sound pressure level measured in open space at 1 m in front of unit	approx.	dB (A)	60



¹⁾ Without TFT colour touch panel, without door lock and hinges.

All technical changes reserved.

Test systems for professionals. Test the best...



A complete line of systems is available offering test space volumes ranging from approx. 34 l to 2,160 litres, a working range from $-75 \dots +180^{\circ}\text{C}$ and relative humidity values ranging from 10... 98% r.h.

We also offer an extensive line of field-proven test systems specially for simulating exposure to weather, temperature shock, corrosion and long-time tests for application in research, development, quality control and production.

Of course, Weiss – as one of the leading producers of environmental simulation systems world-wide – offers the entire spectrum of high-tech test systems starting from a series of cost-effective test systems up to customised walk-in chambers and in-line systems.

If it's know-how, service and reliability that you are looking for – contact Weiss Umwelttechnik.

You can find further information, technical branch offices in Germany, subsidiaries and representations worldwide at

www.weiss.info



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